•• REMARKS ••

The Official Action of February 4, 2003 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment, non-elected claims 1, 4 and 9 have been canceled without prejudice or disclaimer. Applicant reserves his right to seek patent protection for the subject matter of the non-elected claims by filing one or more divisional applications during the pendency of the present application.

Claim 6 has been canceled without prejudice or disclaimer.

The limitations previous presented in dependent claim 6 have been incorporated into independent claim 5.

In addition, independent claim 5 has further been changed to recite that the metallic substrate has been removed to provide a resin sealing body having a bottom so that rear surfaces of the first metallic layers and second metallic layers are flush with the bottom of said resin sealing body.

Support for this change to independent claim 1 can be readily found by comparing Figs. 5A-5C where the metallic substrate 9 has been removed.

Entry of the changes to the claims is respectfully requested.

Claims 5, 7 and 8 remain pending in this application.

Claims 5-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,166,430 to Yamaguchi in combination with U.S. Patent No. 6,247, 229 to Glenn and U.S. Patent No. 6,333,252 to Jung et al.

Claims 5-8 were also rejected under 35 U.S.C. §103(a) as being unpatentable over Jung et al. in combination with Glenn.

For the reasons set forth below, it is submitted that all of the pending claims are allowable over the prior art of record for the reasons set forth below and therefore, each of the outstanding rejections of the claims should properly be withdrawn.

The Examiner has relied upon Yamaguchi as disclosing a method of manufacturing a semiconductor device that comprises the steps of forming an electrodeposition frame on a flexible substrate 28, wherein the electrodeposition frame has first metallic layers 24 and second metallic layers 22 for external extension.

The Examiner states that in Yamaguchi the first metallic layers are thicker than the second metallic layers

The Examiner further states that a semiconductor with electrode pads 23a is contiguously mounted on the first metallic layers, the electrode pads are wire bonded to the second metallic layers, and the semiconductor is resin-sealed as it is mounted on the electrodeposition frame using the substrate as a lower die, after which the substrate is removed and the second metallic layers are cut.

The Examiner concedes that Yamaguchi does not teach:

> ...a plurality of semiconductor elements, cutting a resin sealing body into individual semiconductor devices, a metallic flexible substrate, after cutting depositing metallic layers for electrodes to the second metallic layers exposed from a rear surface of said resin sealing body or the first and second metallic layers exposed from a rear surface of said resin sealing body or the first and second metallic layers between about 20 to 35 microns.

The Examiner has accordingly relied upon Glenn as teaching a method of manufacturing semiconductor devices that comprises:

> ...cutting a resin sealing body of a plurality of semiconductor elements to form into individual semiconductor devices and deposition metallic layer for electrodes to the second metallic layers exposed from a rear surface of said resin sealing body.

In combining the teachings of Yamaguchi and Glenn the Examiner takes the position that:

> It would have been obvious....to utilize the packaging method for a plurality of semiconductor devices for mass fabrication, to cut the resin in order to separate the package into individual packages and to provide metallic layer for electrodes to the second metallic layers exposed from a rear surface of said resin sealing body in order to connect the package to external circuitry as taught by Glenn.

The Examiner has relied upon Jung et al. as utilizing "an inherently flexible metallic substrate (260) to enable a package body to be formed over a semiconductor chip."

In further combining the teachings of Yamaguchi and Glenn with Jung et al. the Examiner takes the position that:

> It would have been obvious....to form Yamaguchi's substrate as a metallic substrate, since both plastic and metallic bases are well known in the art as temporary basis used to form a package body over a semiconductor chip.

For the reasons set forth below, it is submitted that the Examiner proposed combination of Yamaguchi, Glenn and Jung et al. is improper under 35 U.S.C. §103 and therefore, the rejection of the claims based upon these references should be withdrawn.

At column 12, line 61 through column 13, line 9 Yamaguchi teaches:

> It should be noted that level differences are formed between the die pad 14 and the back surface of the resin encapsulant 19 and between the respective back surfaces of the signal-connecting lead 9 and the resin encapsulate 17. This is because the plastic

> film 12 softens and thermally shrinks owing to the heat applied to the die assembly during the encapsulation, and the die pad 14 and the signal-connecting leads 9 are strongly forced into the plastic film 12. Accordingly, in this structure, the die pad 14 and the signal-connecting leads 9 protrude downward from the back surface of the resin encapsulate 19. As a result, standoff heights (or protrusion heights) can be secured for the die pad 14 and the external terminals 20, i.e., the respective lower parts of the signal-connecting leads 9. For example, in this embodiment, since the thickness of the plastic file 12 is 50 μm, the protrusion heights may be about 20 μm.

At column 11, lines 49-52 Yamaguchi teaches that:

> In this process step, the protrusion heights of the external terminals 20 and the die pad 14 can be adjusted if the desired thickness of the plastic film 12 is changed.

The "protrusion heights" referred to in the above portions of Yamaguchi are an essential feature of Yamaguchi.

As taught at column 10, lines 8-14:

> Secondly, a standoff height, which should be secured for connecting the external terminals 20 and the die pad 14 to electrodes of a motherboard during mounting of the resin-molded semiconductor device onto the motherboard, has already been provided for the external terminals 20 and the die pad. This is because the external terminals 20 and the die pad 14 protrude downward from the lower surface of the resin encapsulate.

In view of the above teachings, goals and improvements provided by Yamaguchi, it is submitted that: 1) it is important to provide the "standoff height" or "protrusion height" taught by Yamaguchi; and 2) in order to provide such "standoff height" or "protrusion height" it is important to use the plastic film 12.

The Examiner's proposed modification of Yamaguchi to use a metal substrate in place of plastic film 12 is clearly improper since this modification would destroy the express teachings of Yamaguchi and eliminate the "standoff height" or "protrusion height" required by Yamaguchi.

As held by the PTO Board of Patent Appeals and Interferences:

> References cannot properly be combined if effect would destroy invention on which one of reference patents is based. *Ex parte Hartmann*, 186 USPQ 366 (PTO Bd App 1974)

The Examiner states that support for the proposed combination is based on plastic and metallic bases or substrates being alternatives in the art.

The Examiner's position is clearly contrary to the teachings or invention of Yamaguchi which relies upon plastic film layer 12 softening and thermally shrinking as stated in the cited portion of Yamaguchi reproduced above.

Clearly, metals and plastics are not functionally equivalents or alternatives as applied to the teachings of Yamaguchi.

In relying upon Glenn, the Examiner states that element 34 of Glenn has been construed to be applicant's claimed thin metallic films that are deposited on the portions of the first and second metallic layers that are exposed at the bottom said resin sealing body.

It is noted that the elements identified by reference numeral 34 in Glenn are "solder balls."

Anyone with any skill whatsoever in the art of semiconductor device fabrication would never construe "solder balls" to be thin metal films.

While the Examiner is certainly allowed to broadly interpret limitations of an applicant's claims when applying prior art for purpose of determining patentability, deference needs to be given to what the prior art actually teaches those skilled in the art. The prior art needs to be construed properly as would be viewed and understood by those skilled in the art.

It is accordingly, submitted that Glenn cannot be property relied upon as teaching metallic thin films that are deposited on portions of the first and second metallic layers that are exposed at the bottom said resin sealing body.

Jung et al. teaches depositing "metal flash" 252 on the exposed surface of the metal plate which "metal flash' prevents the die pad 232.

At column 3, lines 17-20 Jung et al. teach:

> The protective metal flash 252 prevents the die pad 232 and the connection pads 230 from corrosion.

As further taught by Jung et al. at column 3, lines 53-56:

> The metal flash 252 protects the die pad 232 and the connection pads 230 from etching agents during the removal of the metal plate 260...

Applicant's independent claim 1 requires the step of:

> ...depositing metallic thin films on portions of the first and second metallic layers that are exposed at the bottom said resin sealing body.

Because the "metal flash" of Jung et al. is deposited on the metal plate 260 in an initial step of the fabrication, Jung et al. does not teach nor require depositing metallic thin films on the first and second metallic layers after the metal plate 260 is removed. That is, there are no surfaces of the first and second metallic layers that are exposed at the bottom of the resin sealing body that are required to be deposited with a thin metallic film.

It is important to recognize that applicant's claims are method claims and the limitations thereof are method steps.

Jung et al. does not teach the step of depositing metallic thin films on portions of the first and second metallic layers that are exposed at the bottom said resin sealing body.

If the Examiner were to construe metal flash layers 252 as being applicant's metallic thin films that are deposited on portions of the first and second metallic layers that are exposed at the bottom said resin sealing body, then, the layers 230 and 232 would not be flush with the flush with the bottom of said resin sealing body as required by applicant's method claims.

It is submitted that a careful reading of Jung et al. will reveal that Jung et al. does not teach the elements of applicant's claimed invention accordance to the manner in which the Examiner has relied upon Jung et al. on page 5 of the Official Action.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a *prima facie* case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

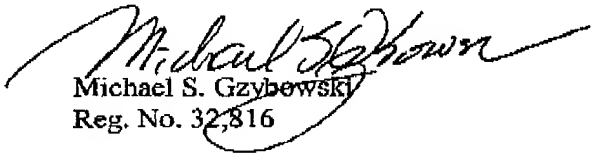
Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remains outstanding issues in the present application that could be resolved, the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,



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Marked-Up Copy of the Claims
As Amended on October --, 2002

Non-elected claims 1, 4 and 9 and claim 6 have been canceled without prejudice or disclaimer.

5. (Twice Amended) A method of manufacturing a semiconductor device comprising the steps of:

forming an electrodeposition frame on a flexible flat metallic substrate, said electrodeposition frame having first metallic layers and second metallic layers for external extension being patterned, wherein said first metallic layers are thicker than said second metallic layers;

contiguously monitoring a plurality of semiconductor elements, each with electrode pads thereon, on said first metallic layers;

wire-bonding the electrode pads to said second metallic layers which are located between said semiconductor elements;

resin-sealing said semiconductor elements mounted on said electrodeposition frame;

removing said metallic substrate to provide a resin sealing [body; and] body having a bottom so that rear surfaces of the first metallic layers and second metallic layers are flush with the bottom of said resin sealing body;

cutting said resin sealing body into individual semiconductor devices, wherein each device is provided with the first and second metallic [layers.] layers; and

depositing metallic thin films on portions of the first and second metallic layers that are exposed at the bottom said resin sealing body.